

0895936.071797

FIGURE 1

68588 U.S. PTO  
08/895936  
07/17/97

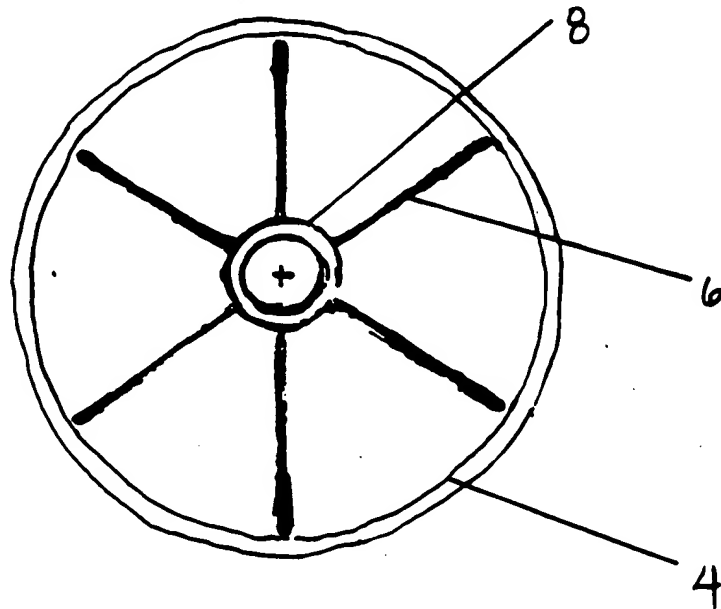
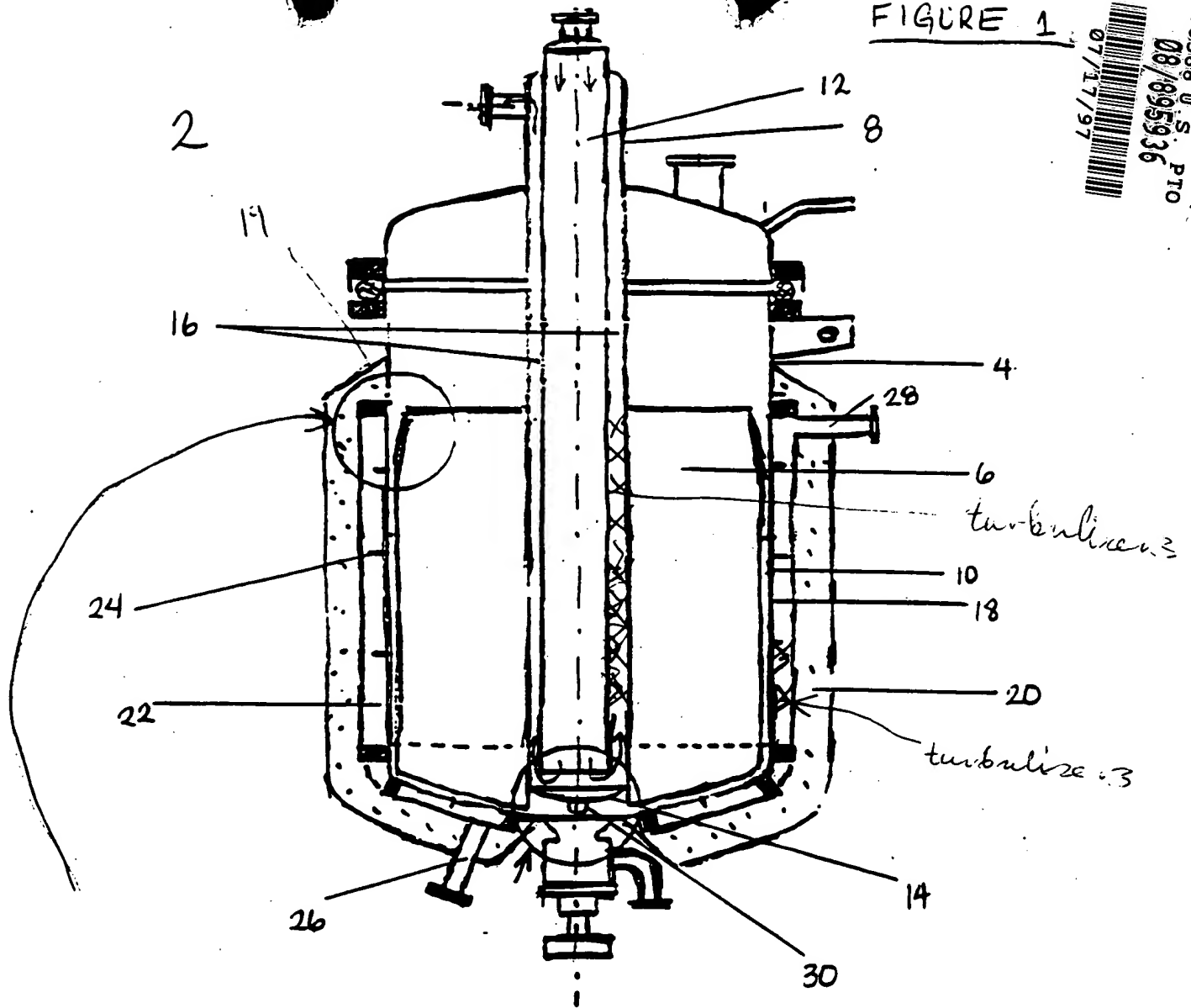
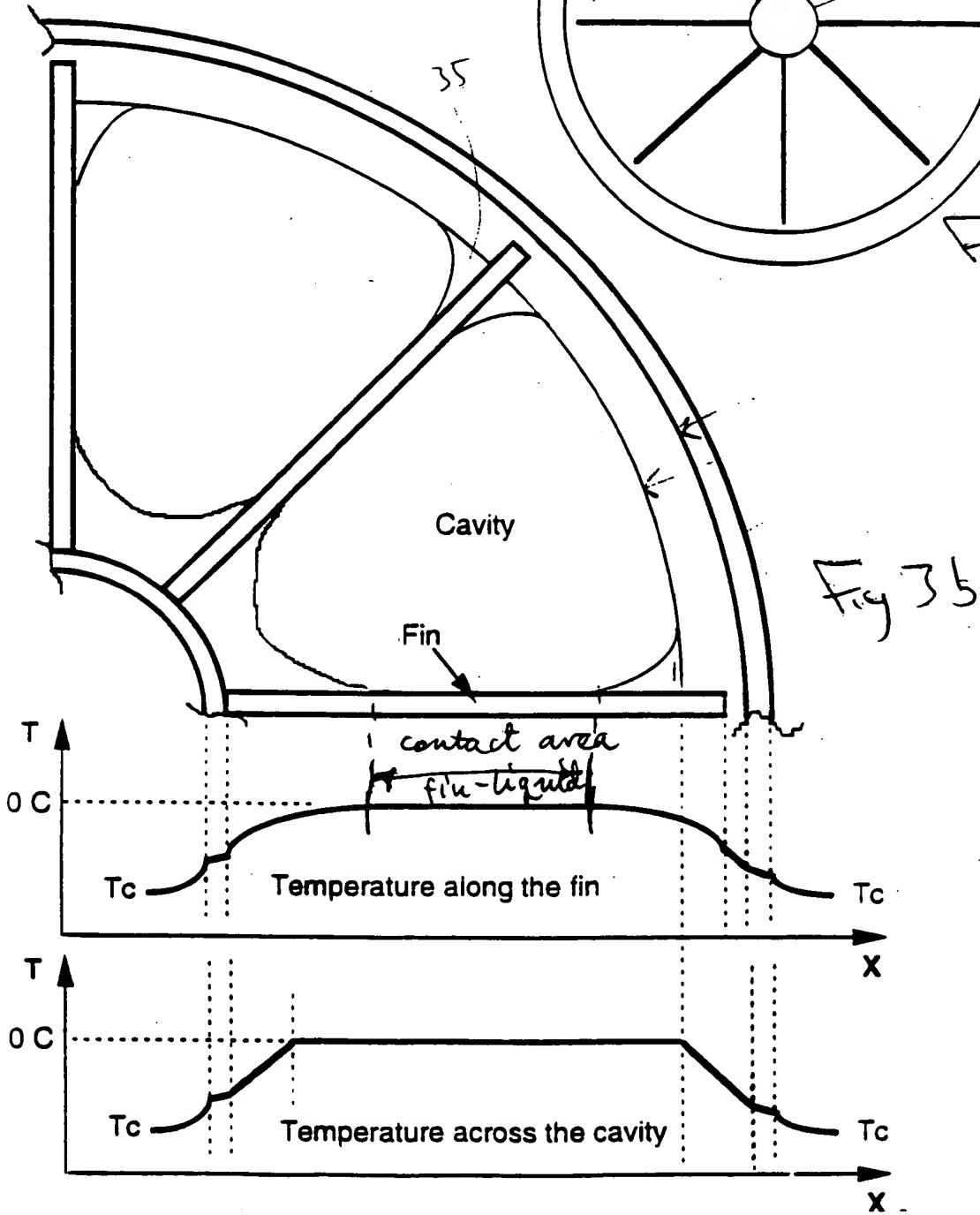
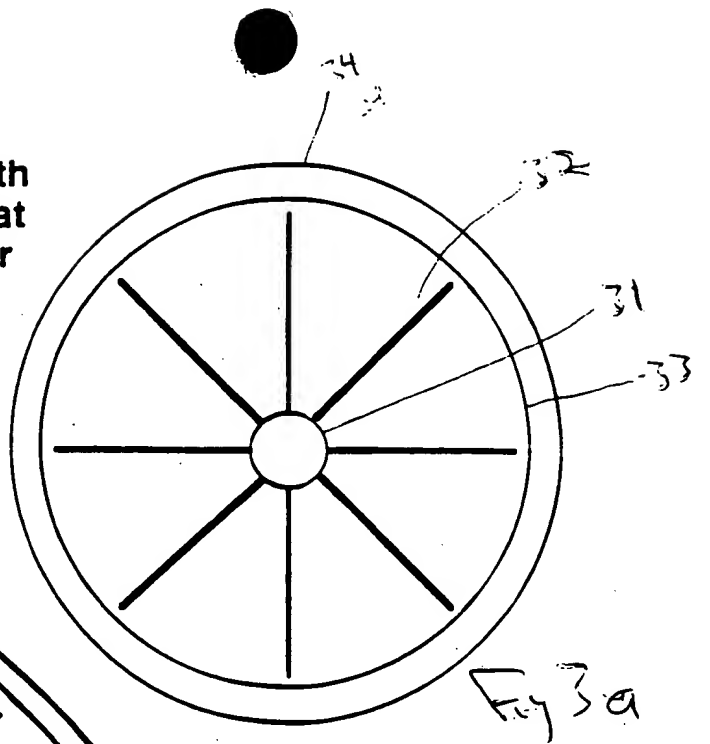


FIGURE 2

V ss I with  
finned heat  
exchanger

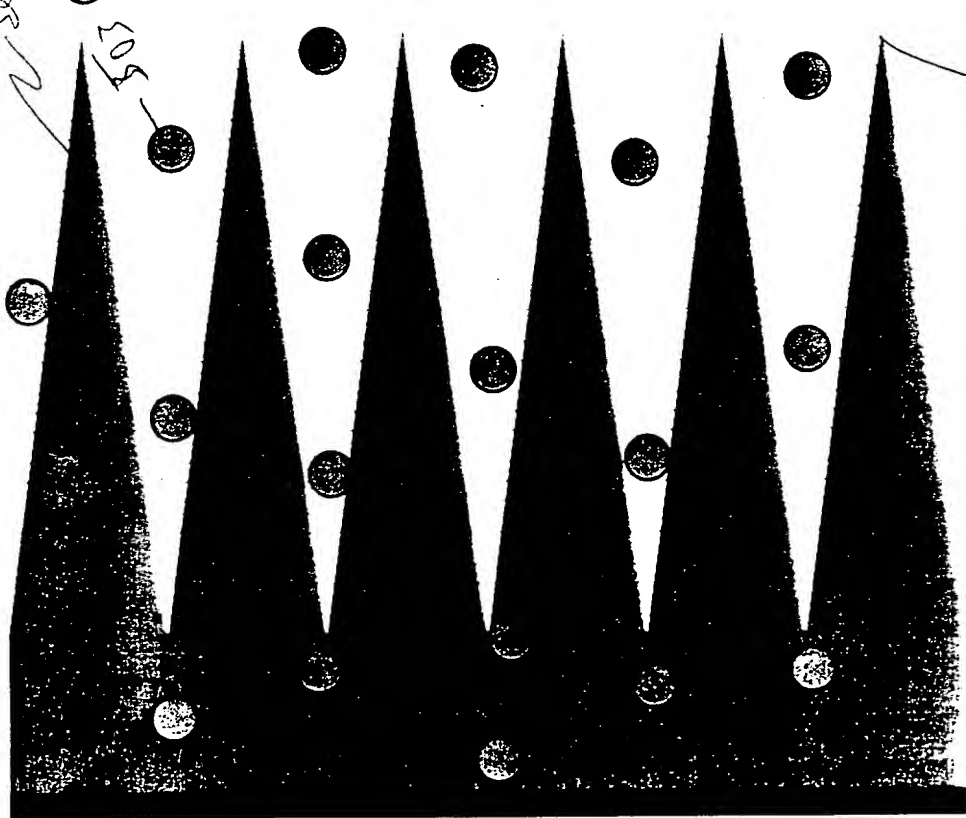
Section



08895936-07197

264T20" 9E656880

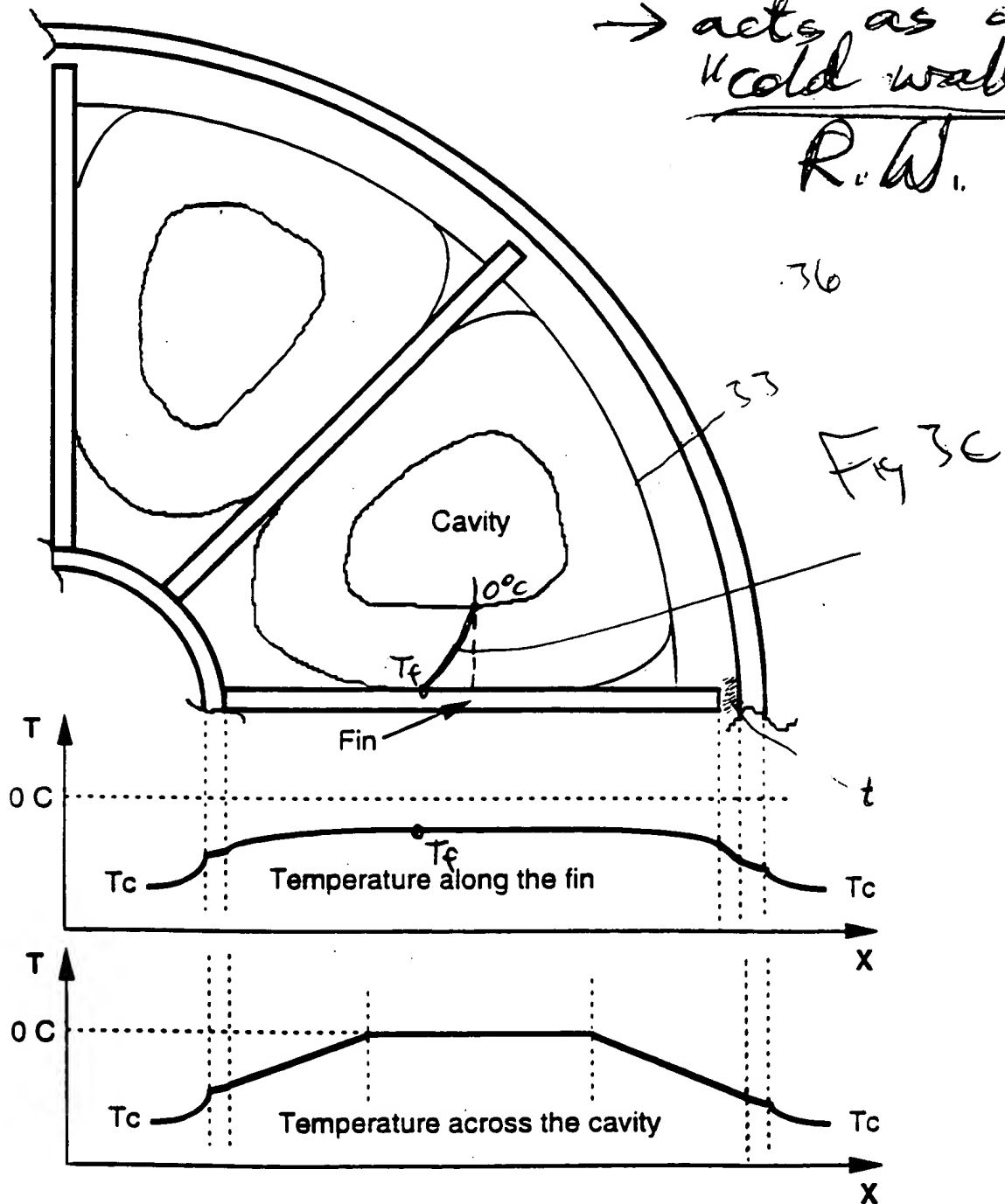
# Dendritic Ice Growth



08895936 .071797

# Section of the vessel with internal finned Heat exchanger

→ acts as a "cold wall"  
R.W.



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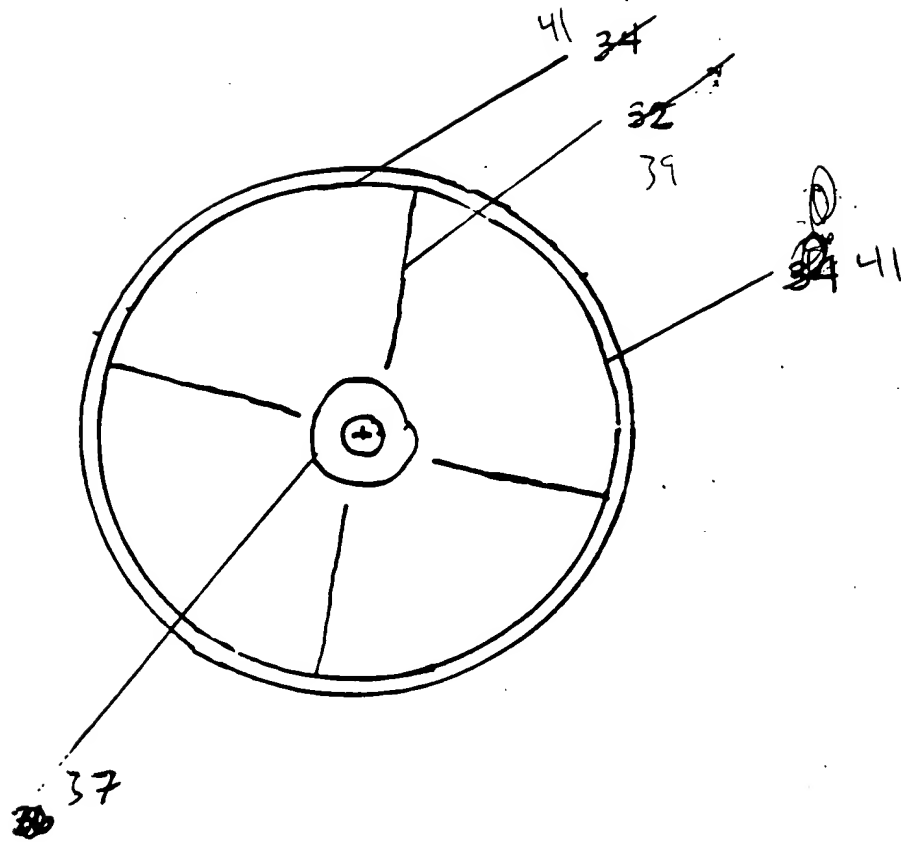
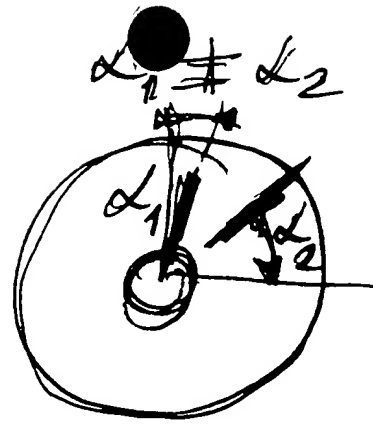


FIGURE 34



$d_1 \approx d_2$   
or  
 $d_1 \neq d_2$

38

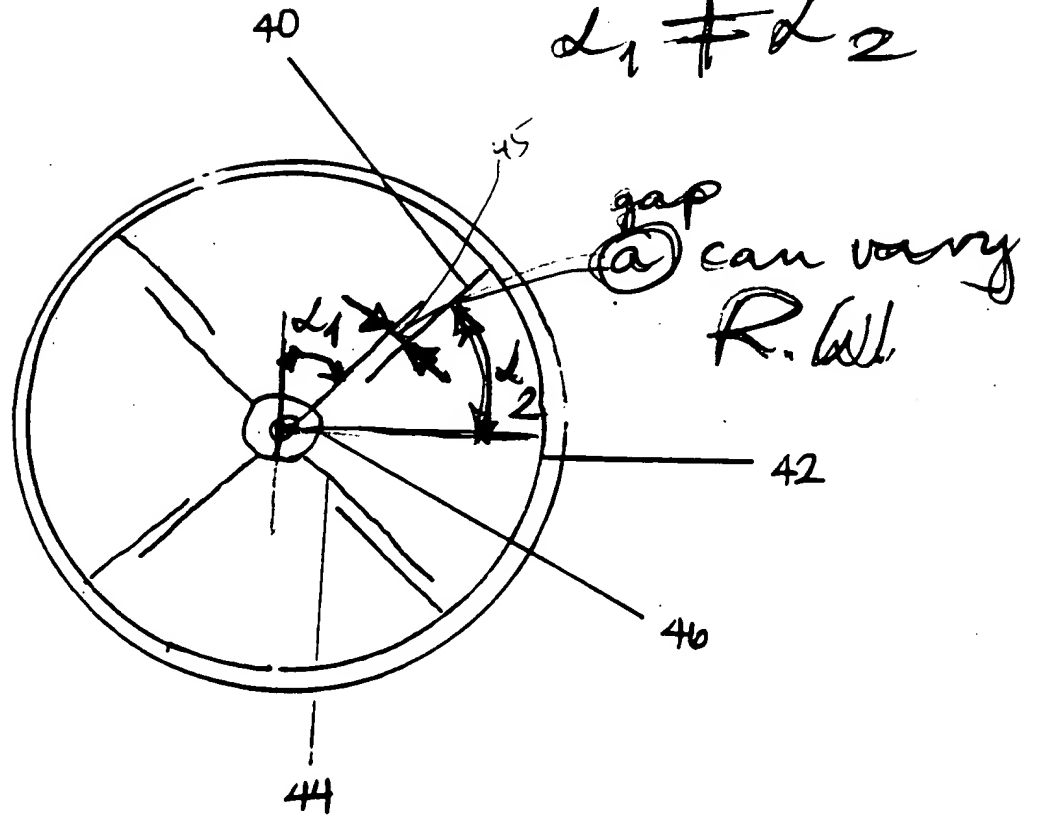


FIGURE 4<sup>5</sup>

262720-9E656880

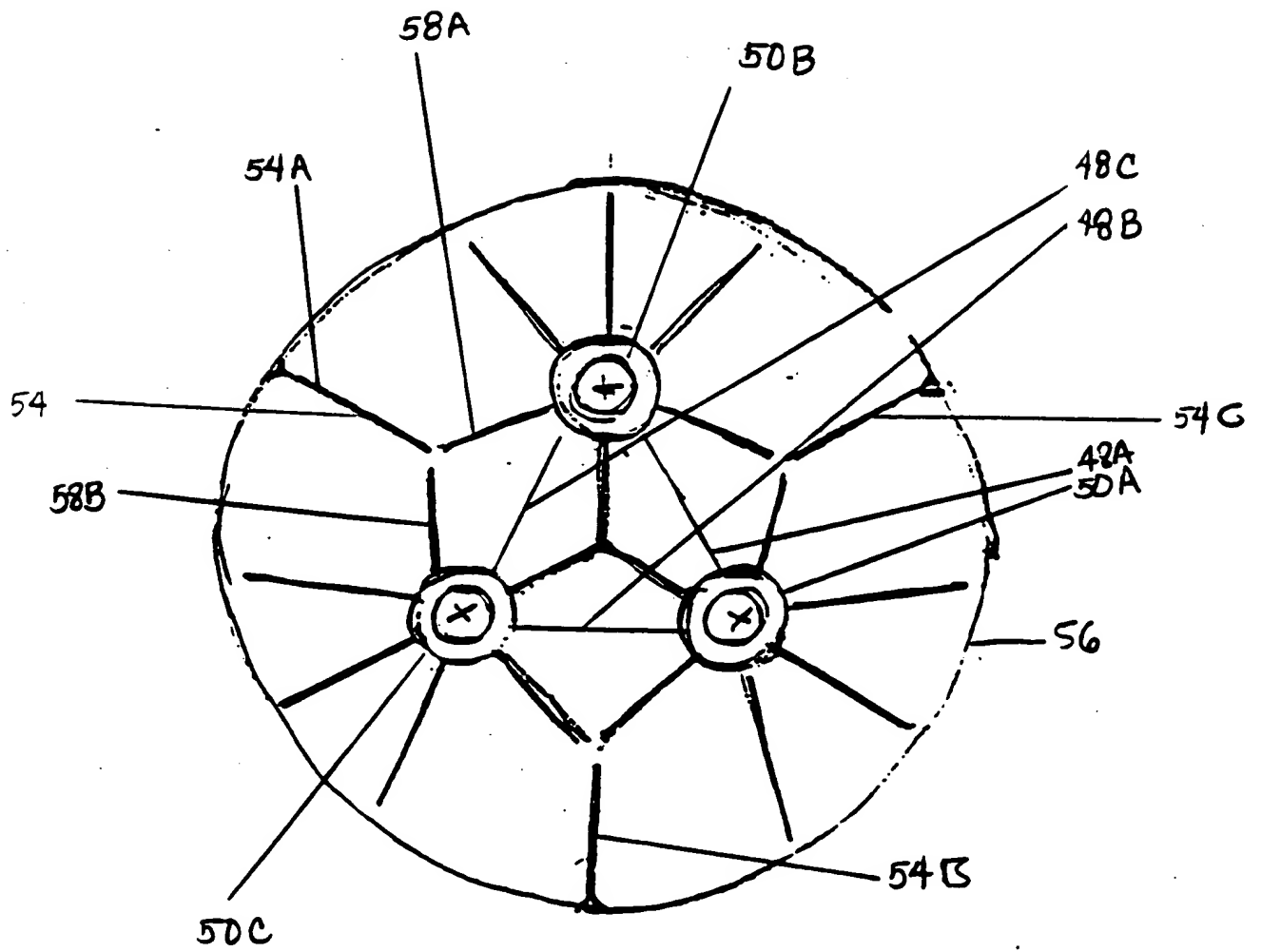


FIGURE 5<sup>6</sup>

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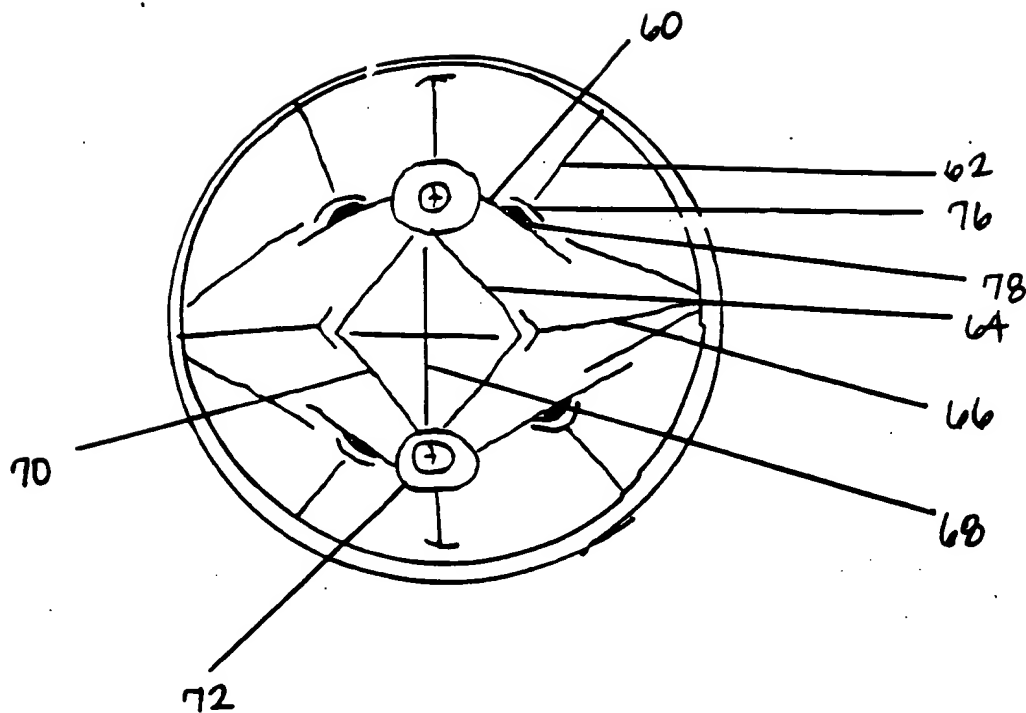
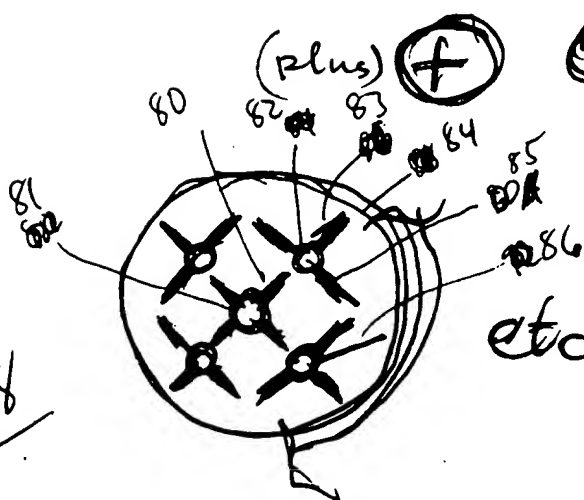


FIGURE 7



Other combinations  
(for sake of the disclosure)

R.W.

etc,

R.W.

Fig 8

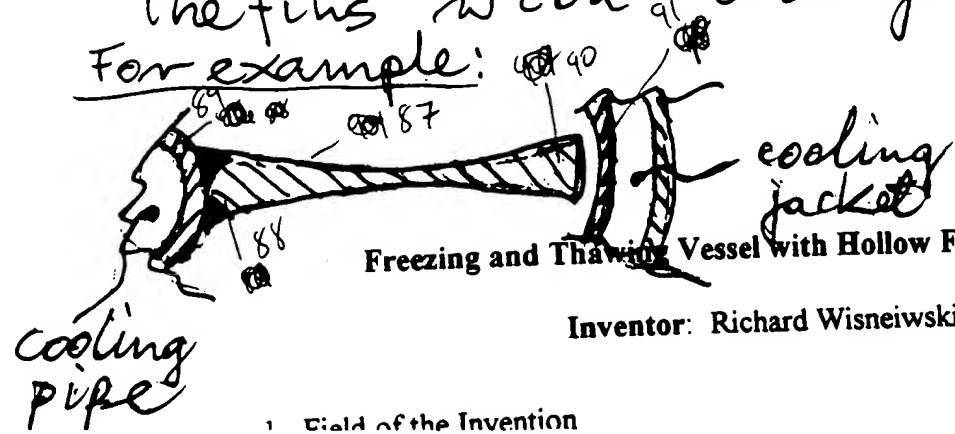


(started in pencil R.W.)

General: Include in descriptions the fins with change in thickness  
For example:

PATENT  
Attorney Docket  
No. 17882.702

R.W.



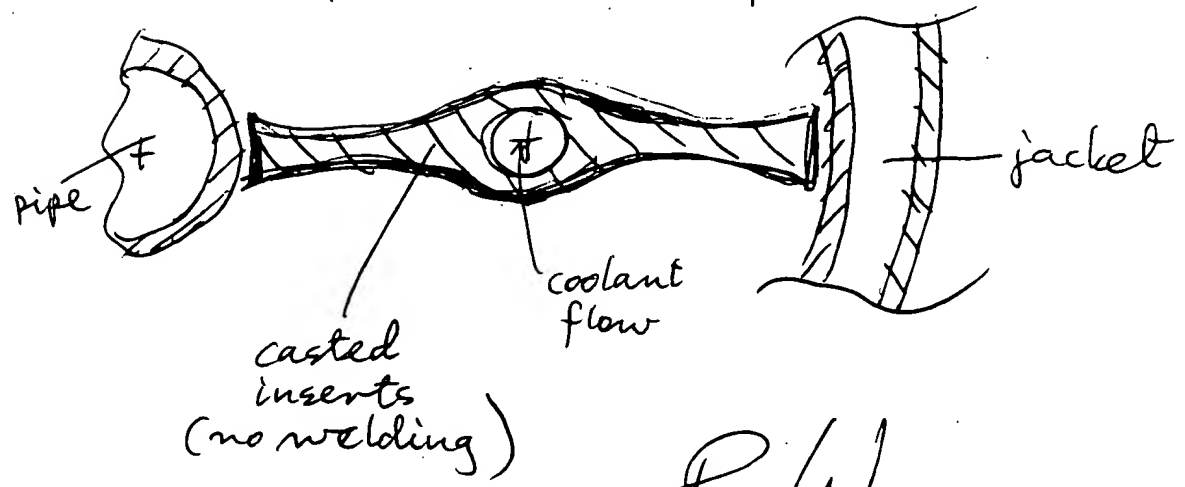
Freezing and Thawing Vessel with Hollow Fins and Baffles

Inventor: Richard Wisniewski

1. Field of the Invention

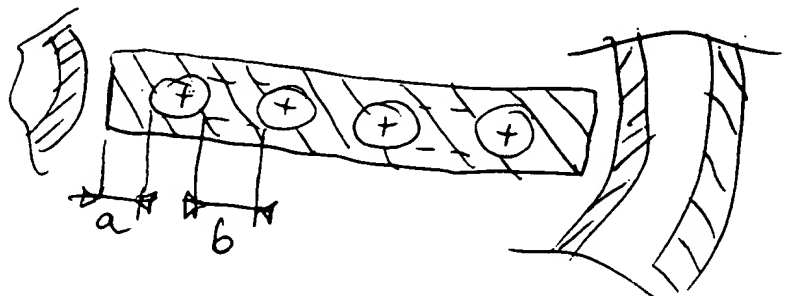
Fig 9

Also a profiled fin

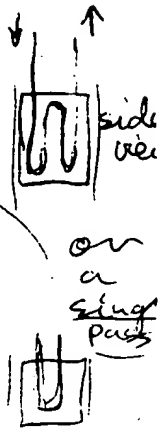


R.W.

Casted inserts can be simpler

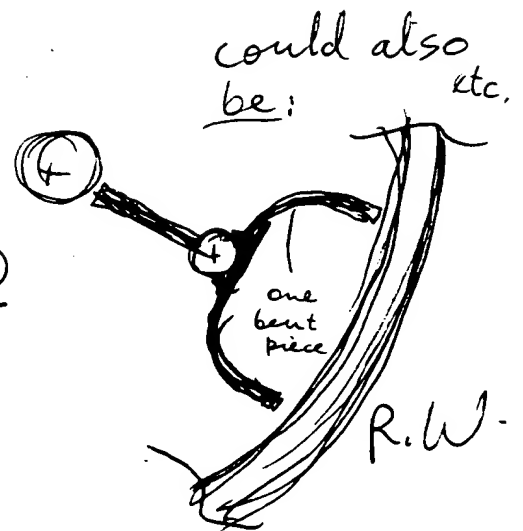
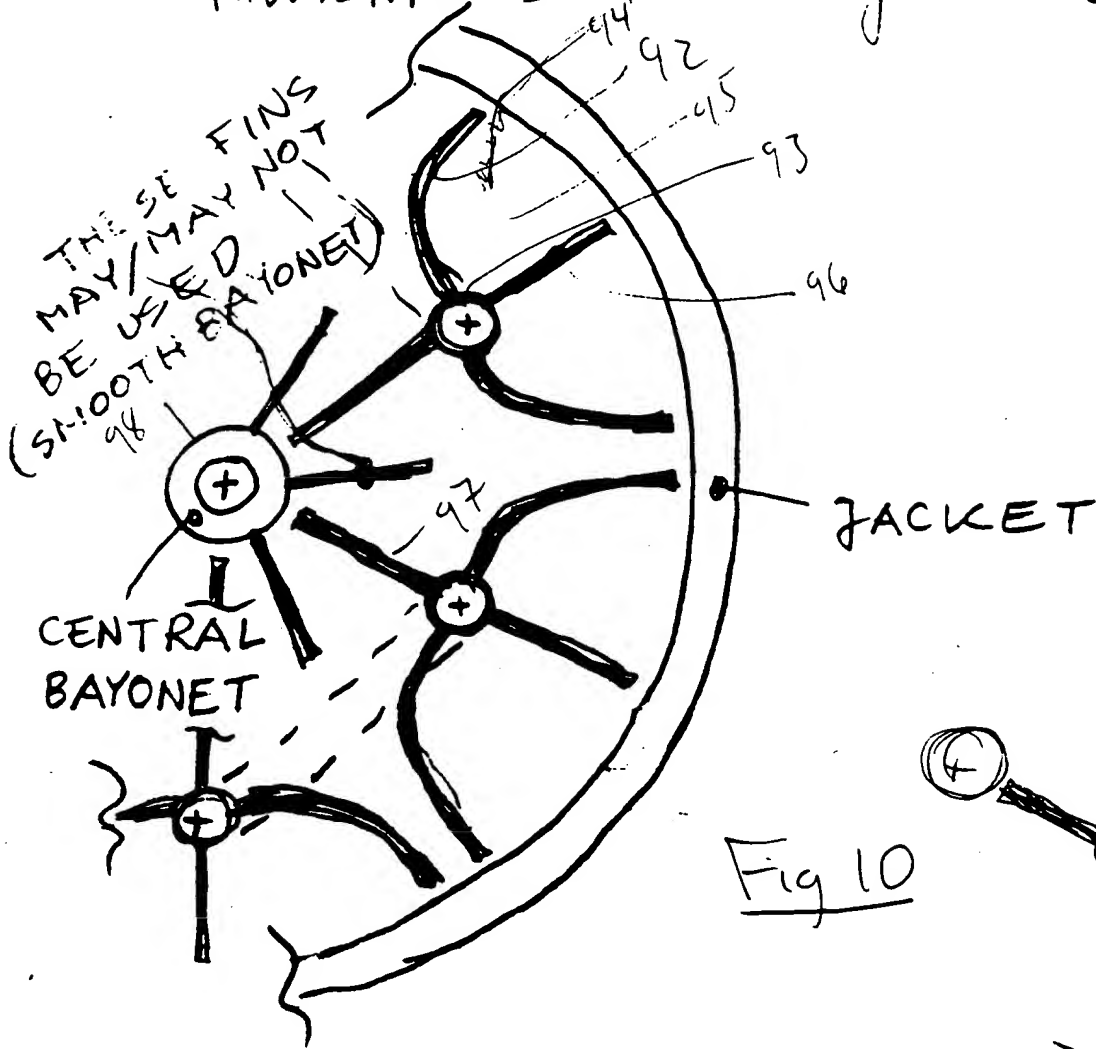


$a = b$   
or  $a \neq b$



BY: R. WISNIEWSKI

June 16, 1997

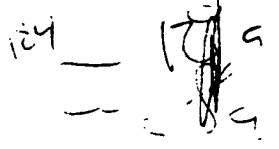
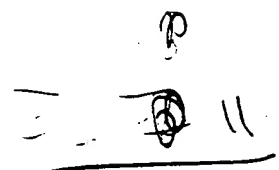
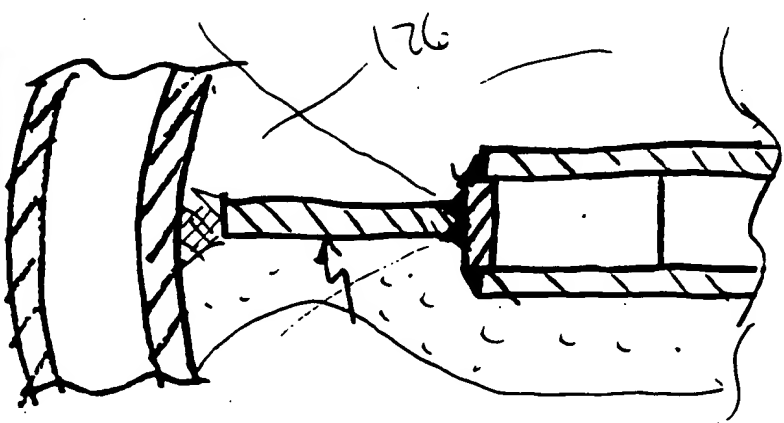
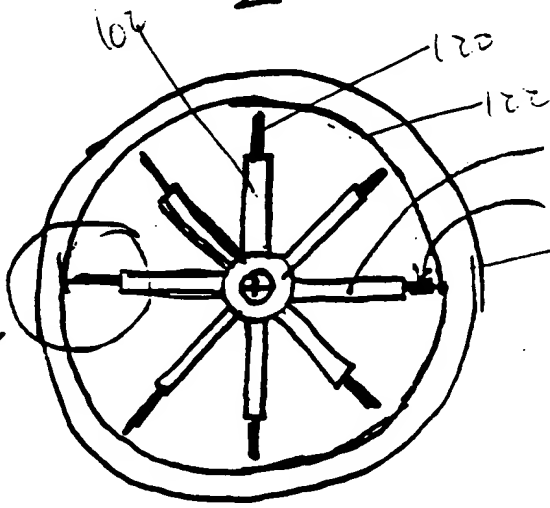
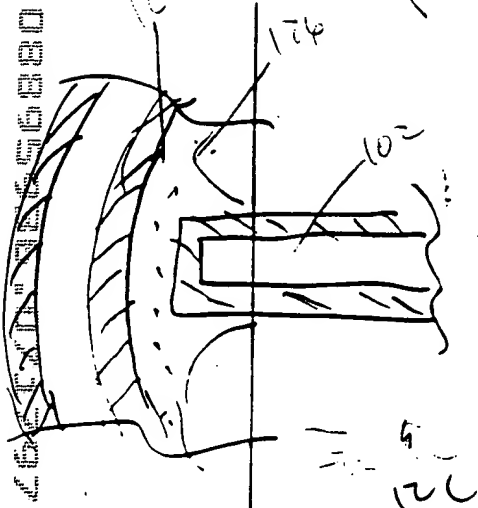
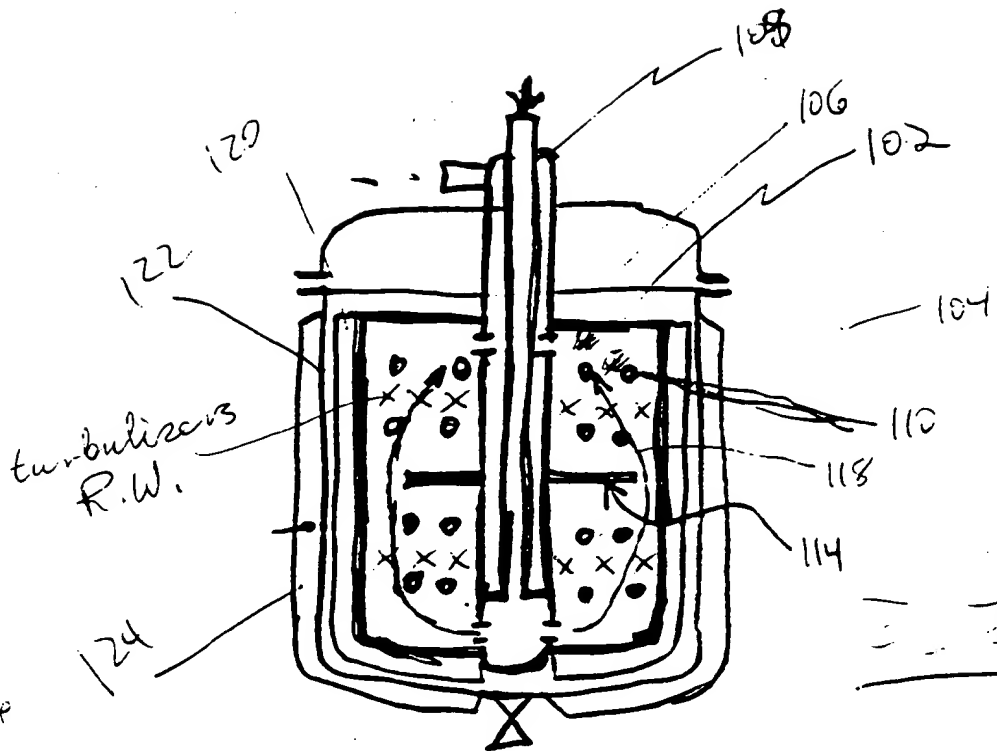


CONCEPT OF CREATING  
COMPARTMENTS USING  
BENT FINS.

Richard Wisniewski

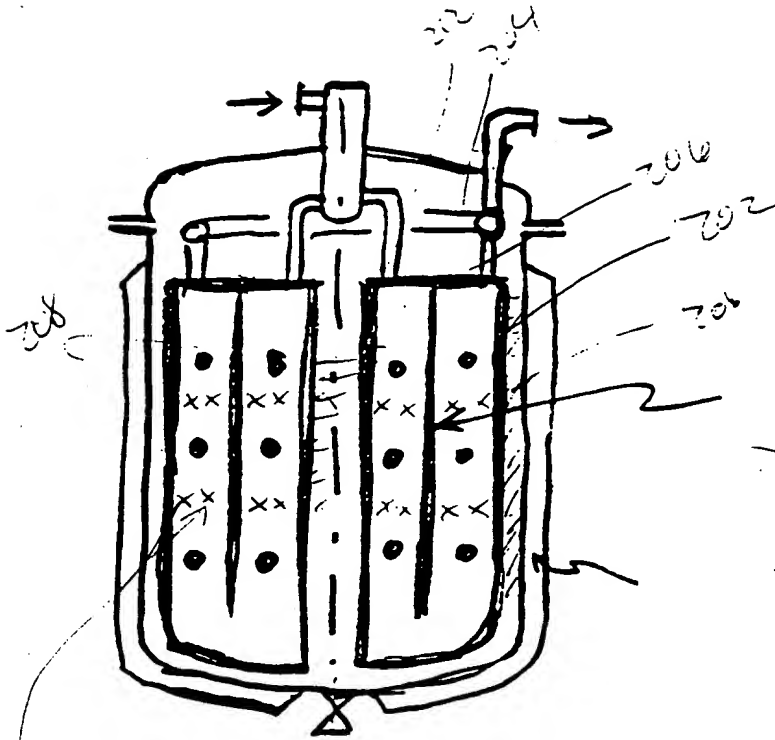
262720-92556880

22-141 50 SHEETS  
 22-142 100 SHEETS  
 22-144 200 SHEETS

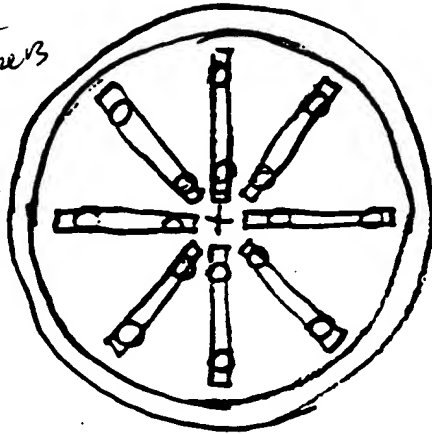


089593-01797

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS

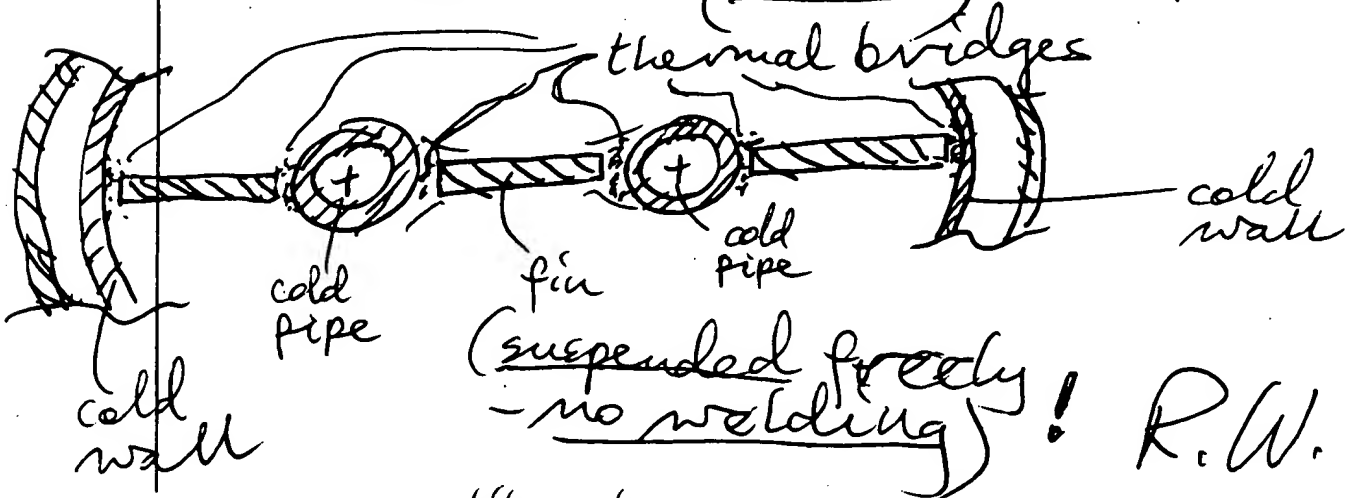


possible  
turbulizers



Plates  
R.W.

Another (new) interpretation



see 68 546

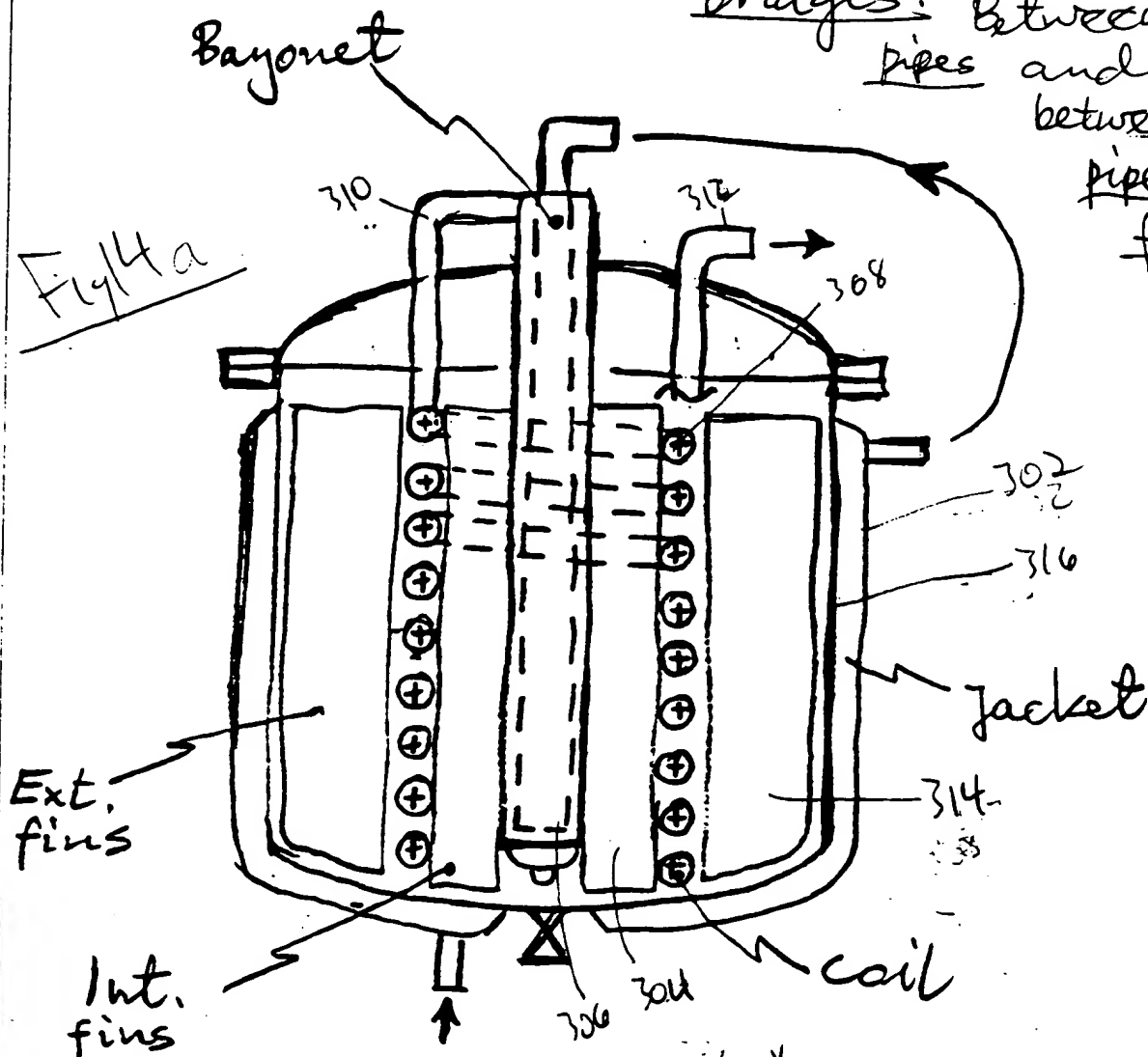
R.W.

262720" 92656880



"Bubble thermal bridges" Between pipes and between pipes and fins  
R.W.

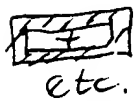
Fig 14a



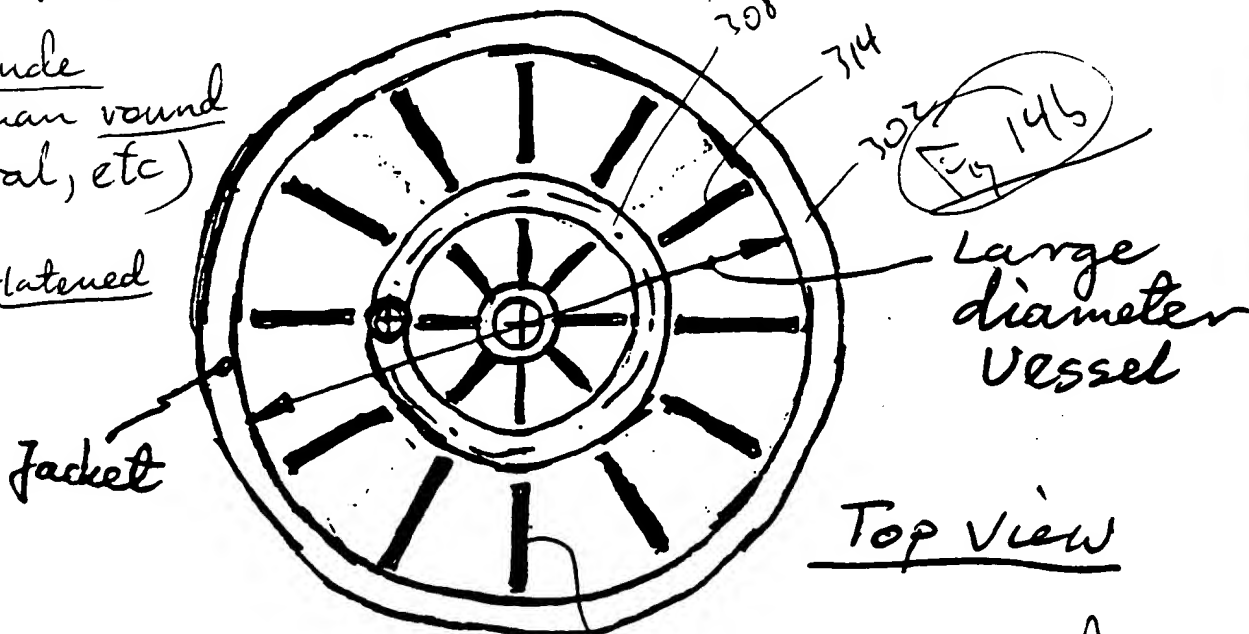
Do include other than round pipes (oval, etc)



flattened



etc.



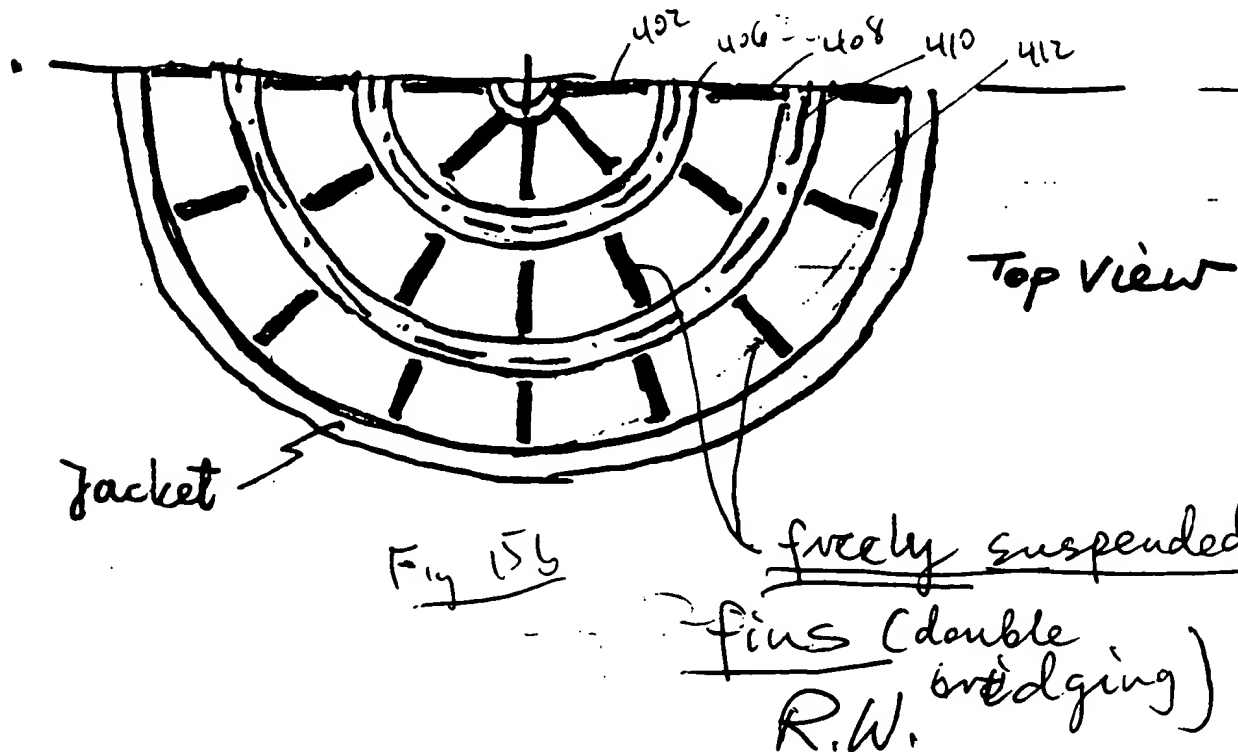
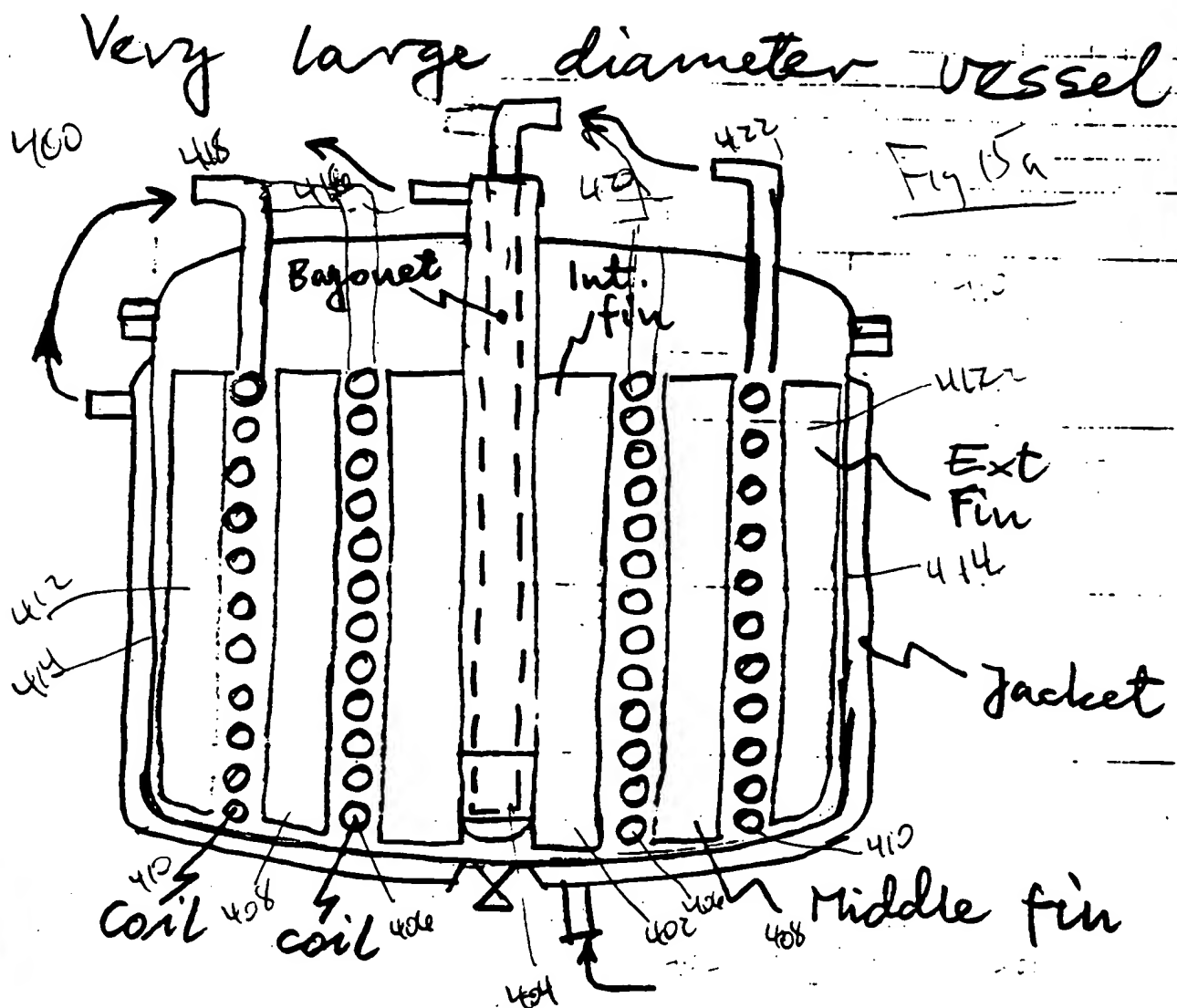
Top view

suspended  
fin  
R.W.

Fig 14b

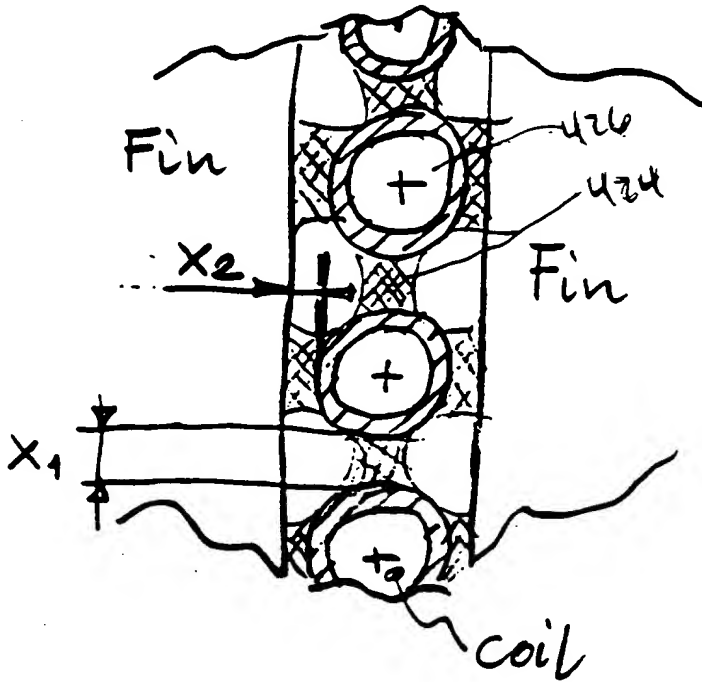
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30 SHEETS 3 SQUARE  
100 SHEETS 3 SQUARE  
200 SHEETS 3 SQUARE  
300 SHEETS 3 SQUARE




# Double thermal bridges R.W.

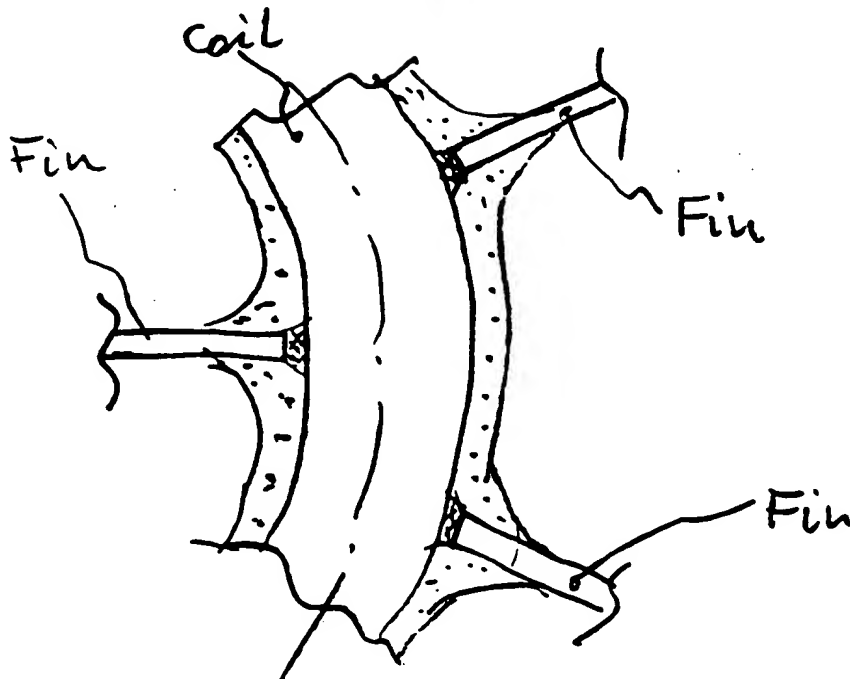
## Details: Thermal bridges:



15c

 Thermal bridges of solidified material

$X_1, X_2$  - optimized



Top view

15d

Here: also flattened/oval/square pipes  
over

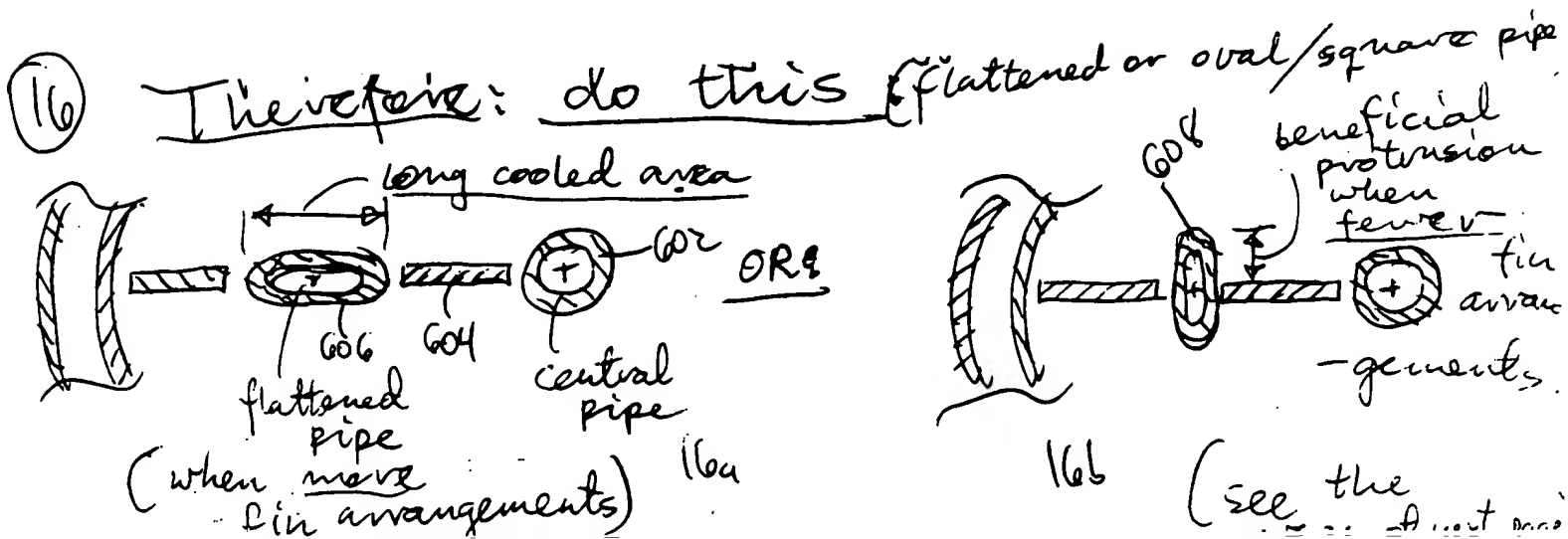
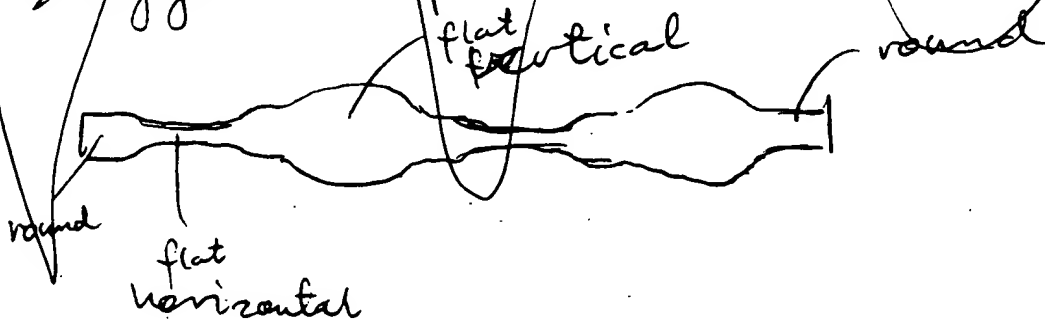
262T20-92656880

41 181 30 SHEETS 3 SQUARE  
42 182 100 SHEETS 3 SQUARE  
43 183 100 SHEETS 3 SQUARE



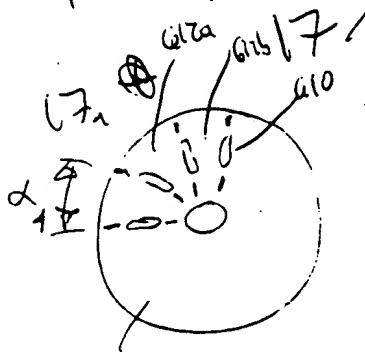
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To turbulentize the fluid in spiraled pipes ~~(plus)~~ they can be flattened in staggered pattern.

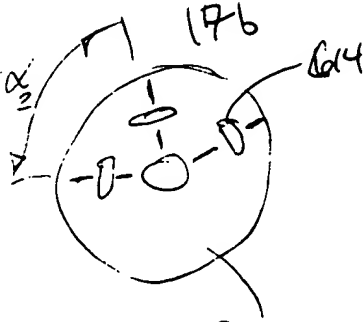




Flattened / oval / square pipes:



many fin assemblies  
( $L_1$  small)

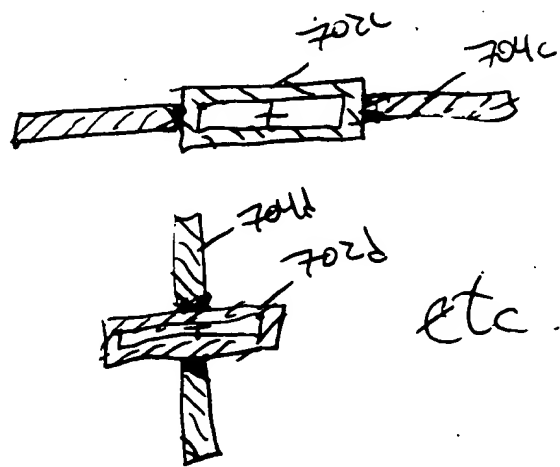
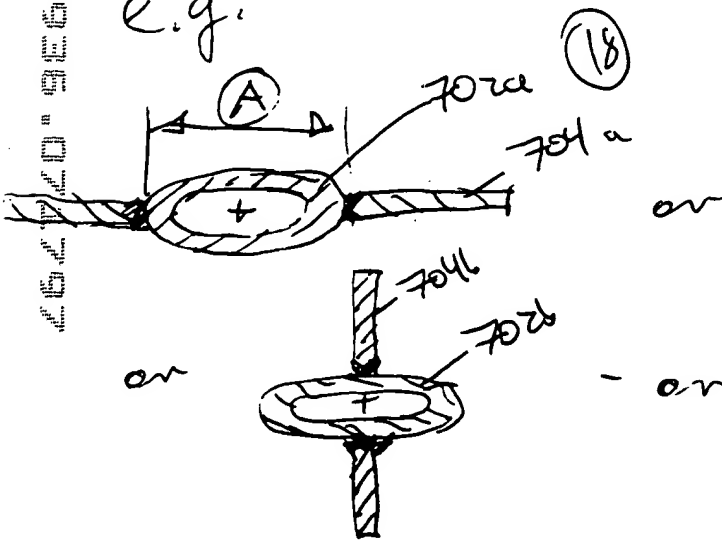


fewer fin assemblies  
( $L_2$  large)

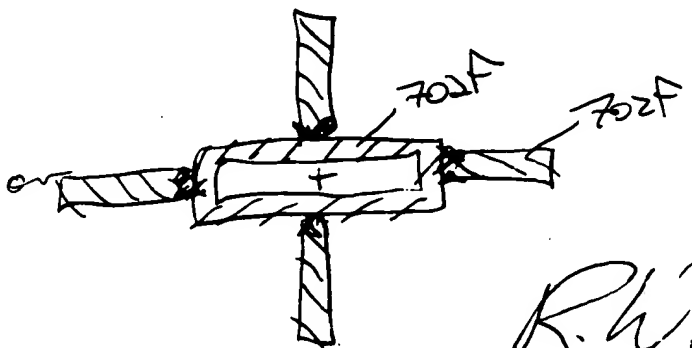
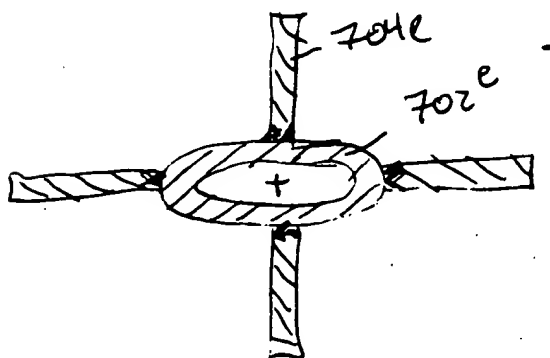
Advantage of such pipes  
→ longer (A) dimension → better compartmentization of space  
"longer" areas directly cooled!

Also - flattened / oval / square pipes with welded fins (or casted etc.)

e.g.



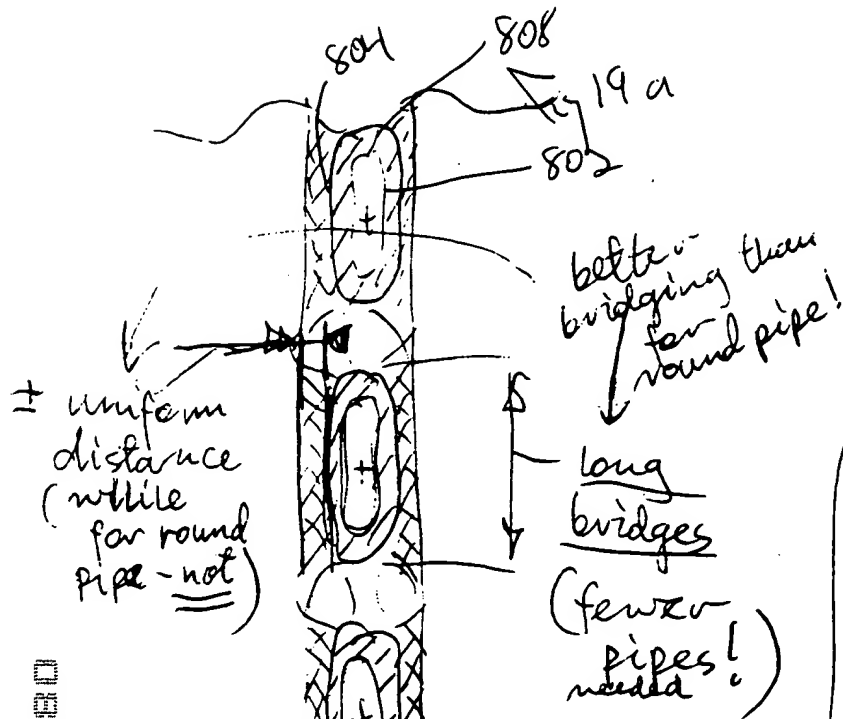
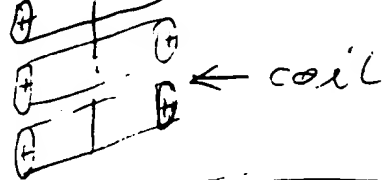
or combined



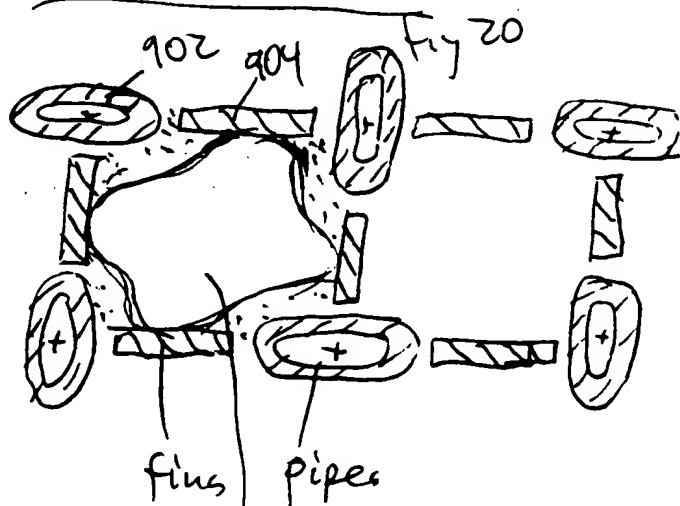
R.H.

flattened/oval/square pipes (continued)

(spiral/coil made of flattened pipes)

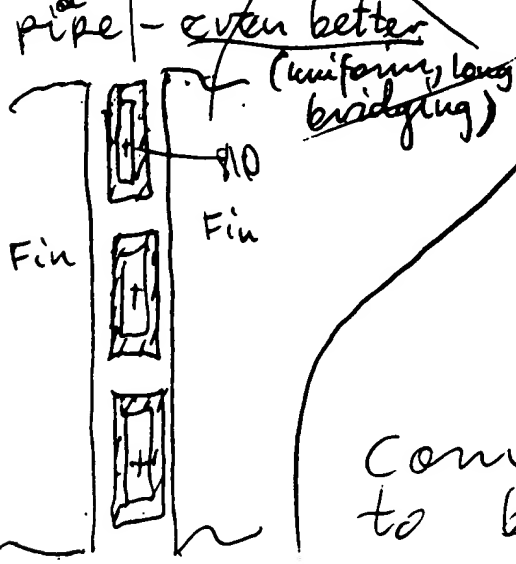


Flattened/shaped pipes could be further explored for example: a combination:



462720-9255880

Fig 19b: Square pipe - even better (uniform, long bridging)



R.W.

Purpose - if certain compartmentization has to be done in large vessels.